

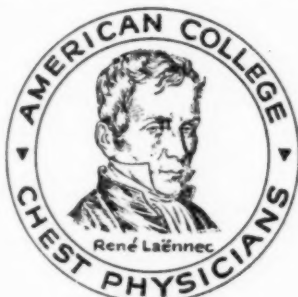
## DISEASES

OF THE

## CHEST

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## Editorial Comment

DIVISION OF  
MEDICAL DUTIES  
IN A SANATORIUM

THE best interests of  
 a patient in a Sana-  
 torium are served if  
 one doctor is in charge

of up to 50 patients and, besides being their  
 examining physician, takes care of their  
 pneumothorax treatments. This arrangement  
 insures the patient constant observation by  
 the physician who gives him his pneumo-  
 thorax treatment. The physician learns all  
 about his patient and is made a better chest  
 specialist by so doing.

Problems which are puzzling to him can  
 then be brought up in conference with the  
 whole Staff. This in many quarters will seem  
 a statement of self-evident truth. However in  
 many of our Sanatoria, one or two men  
 do all of the interesting work and do it on  
 so many people that they cannot have com-  
 plete knowledge of all of the problems in-  
 volved in each individual case; and the rest  
 of the Staff carry out the routine examina-  
 tions and write opinions which too often re-  
 ceive no consideration.

This situation is often times forced by the  
 incompetence and inexperience of many  
 members of the Staff, due to constantly  
 changing personnel because of inadequate  
 pay and bad living conditions.

There should be, therefore, to carry out  
 the proper regime: security for the doctor  
 in his job, a rising pay scale, and proper

housing conditions for him and his family.  
 The wage scale should at least approximate  
 that paid to medical officers in the Army and  
 Navy.

F. W. B.

LIVING CONDITIONS  
OF THE MEDICAL  
PERSONNEL IN  
THE SANATORIUM

CONDITIONS under  
 which the physician  
 lives in a Tuberculo-  
 sis Sanatorium have  
 much to do with the

length of time that the physician remains  
 in the Tuberculosis Specialty. There are some  
 Sanatoria where doctors are provided with  
 a single room without private toilet or bath  
 and where no provision is made for housing  
 his family.

It is a normal thing for a young physician  
 to wish to marry when he completes his in-  
 ternship and the vast majority do. When a  
 physician knows that he cannot marry and  
 have his wife properly housed on the prem-  
 ises with adequate facilities provided later  
 should he have a family, his mind is con-  
 stantly set upon a change. This gives him  
 a tendency to lack interest in the institu-  
 tion and his work.

With Tuberculosis Treatment on the scien-  
 tific plane that it is today, it is essential that  
 institutions provide every incentive to the  
 young physician to make Tuberculosis his  
 life work. By that means alone, can the Sana-  
 torium Patient receive treatment from ex-  
 periented physicians.

F. W. B.

**PREVENTORIA** TIME has shown that the utilization of Preventoria has had little or no effect on our program of tuberculosis control.

It is generally agreed by all authorities that there is very little likelihood of "first infection" type of tuberculosis being an important source of infection. We realize the inherent ability of the average child to successfully combat "first infections" under a very simple regime. This simple therapy can be carried out much more economically in the home than in the Preventoria.

It has been easy for superintendents of state and other institutions to secure appropriations to provide Preventoria for children. There is an appeal to the lay legislator that cannot be discounted, and thousands upon thousands of dollars have been appropriated for the building and maintenance of Preventoria that we now know should have been spent in providing beds for open cases that are sources of infection.

A very comprehensive article on the subject was read by Chester A. Stewart before the National Tuberculosis Association in Milwaukee, Wisc., on June 3, 1937, in which he states: "It now seems preferable, therefore, to convert all Preventoria into hospitals where patients with serious and readily-communicable re-infection forms of tuberculosis can receive the treatment that they need and can be segregated. A change of this character doubtless should permit institutions, which now provide primarily infected children with domiciliary care, to render the *greater* service of making otherwise unobtainable contribution to the treatment and prevention of tuberculosis by focusing the therapy and segregation where it is needed; namely, on the sources which perpetuate the disease in successive generations of man."

The pages of this Journal from its inception have placed superlative emphasis on the segregation of all open cases of tuberculosis, and have urged the use of every available bed for this purpose.

It has always been our opinion that the true function of public health agencies and institutions is to guard the public health from the spread of infectious and communicable diseases.

The folly of sending a child with "first

infection" tuberculosis to a state supported institution and have that same institution refuse to accept the far-advanced case of the father or mother of the child, should be brought to the attention of the public, as well as authorities who set up the regulations of our public institutions. What can be gained by having this child with "first infection" tuberculosis spend a few months in a Preventorium only to be returned to the environment in which he contracted the disease?

We have records of many cases of children being accepted and the father or mother being refused admission because they were too far advanced. Would it not be far better to hospitalize the "source of infection" and allow the "first infection" child to remain at home under the simple therapy that will arrest his disease?

The sooner the public demands the abandoning of methods now known to be obsolete in the control of tuberculosis, and the institution of the now known modern methods of tuberculosis control, the sooner we will reap the benefits of the millions being spent contrariwise.

Tuberculosis can be controlled, but not until there are provisions made for the segregation of all open cases  
C. M. H.

**THE X-RAY EXAMINATION** SO important is the roentgen ray examination in Tuberculosis that the expression in tuberculosis circles is now current "Tuberculosis should be seen and not heard." It is unquestionably true that the most reliable method we have in the detection of a tuberculous lesion in the lungs is the x-ray examination; and in a great many instances is the only way in which such detection can be made. There may be no physical signs heard in the chest, even by the most skillful and expert physicians, but on the roentgen film there will be clearly shown the diseased areas. This is more true, naturally, in the early or incipient stages of tuberculosis (and who can question the importance of making the diagnosis at that time); but even moderate to advanced disease may be present with a dearth or absence of physical findings. The writer has long since, fortunately, been disillusioned in this respect. Let no one have the illusion that he can with

his ears and fingers compete with an x-ray examination. Dispel it, or the vast majority of early, and even many advanced cases of tuberculosis, will be missed.

The physical examination of the chest affords much valuable supplemental knowledge, and perfection in the art of performing it is to be encouraged. Do not eliminate the presence of tuberculosis when the physical examination is negative, nor minimize the extent and gravity of the lesion when signs are few.

Many doctors, and most laymen, think the x-ray or roentgen ray examination an exact or absolute procedure. They consider little, if at all, the question of interpretation of the film. This most important phase of the x-ray examination varies tremendously in different hands. Some will read into the film what is not there and others will see what is not apparent to the uninitiated. The ability to properly evaluate and interpret the clinical significance of shadows on an x-ray film can only accrue from a rich back-ground of experience. Finally, a most serious pit-fall in this important diagnostic method is that of poor films. A poor film not only fails to reveal the condition present; but conversely may be misleading in indicating some non-existent conditions. The writer feels that no x-ray examination is better than a faulty one. Let there be sounded a clarion call for the universal appreciation of the importance of improving the x-ray examination. C. H. H.

**POINTING** THERE has been printed in many issues of this Journal the quotation from Dr. Lawrason Brown, namely, "The most important factor in diagnosis in the majority of cases of pulmonary tuberculosis is keeping the disease in mind." Now to record a few of the pointing signs which should bring the disease tuberculosis to your mind.

Any cough lasting over several weeks should be investigated, with tuberculosis being kept in mind as a highly probable cause of this cough. It so often is. Blood expectoration is presumptive evidence of tuberculosis, and should be so considered until definitely proved otherwise. A generally run down state following measles, Flu, pneumonia, child birth and major operation is suggestive of

the presence of tuberculosis. Determine whether it is present or not. An acute pleurisy, particularly when accompanied by effusion is, in most instances, of a tuberculous nature. Unless very definitely proved contra-wise, consider it tuberculous and treat it as such. In cases of pleurisy always thoroughly investigate the lungs to determine whether or not there is involvement of them. An unexplained fatigue, a loss of weight, and a persistent afternoon or evening fever, points strongly to tuberculosis. Be sure there is no tuberculosis before making other interpretations of the cause. Always view with suspicion the vague, or perhaps pointed, complaints of any patient where there is, or has been, a case of tuberculosis in the immediate family. A patient coming to you complaining of loss of weight and energy and with a slight but persistent cough; whose father or mother died from tuberculosis, is in most instances suffering from tuberculosis also. Under these circumstances, do not dismiss it lightly and with a slap on the back prescribe a tonic and the counsel "stop worrying". Finally, and the list of pointing signs is by no means exhausted, persistent rales or shadows on the roentgen film in the upper parts of the lungs, means pulmonary tuberculosis until a more rational explanation is forthcoming. C. H. H.

#### FIRST INFECTION CASES

PHYSICAL examination of patients is very unsatisfactory in first infections because of the absence of abnormal findings.

A detailed history, careful physical examination, laboratory tests, including the Mantoux, sedimentation rate, and x-ray study seldom leaves the diagnosis undetermined.

Once the diagnosis is made, the question is what to do. The treatment is very simple . . . Bed rest until the fever has been controlled, then controlled exercise with good food, including vitamins . . . The most important of all, however, is the separation of the patient from any further source of infection.

We quote from Dr. Victor O. Wilson in "Minnesota Medicine": "Separation is best accomplished by isolating positive sputum cases in the Sanatorium. First infection tuberculosis patients should not be segregated in institutions." C. M. H.



## Childhood Tuberculosis\*

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TUBERCULOSIS does not manifest itself in any clinical form entirely peculiar to childhood. Because of the high incidence of primary tuberculous infection in childhood in a benign form of pulmonary involvement, this phase of the disease has been called childhood tuberculosis. Studies of the disease in its clinical aspects point to the incidence of tuberculosis in adolescence in a form parallel with the entity formerly designated as childhood tuberculosis. However, a discussion of childhood tuberculosis resolves itself into a description of primary or first infection tuberculosis. The nomenclature as defined in Diagnostic Standards issued by the National Tuberculosis Association should be more rigidly adhered to and more knowledge of the exact clinical status of the individual child's infection will be thereby established.

The two major types of tuberculosis encountered in childhood are Primary Tuberculosis or the First Infection Type and Tuberculosis of Superinfection or Reinfection, the Second Infection Type.

Included in the First Infection Type of tuberculosis are approximately 75 per cent of patients with positive tuberculin reactions in whom lesions are *not* demonstrable by x-ray or clinical examination even though unidentifiable intrathoracic, cervical, intra-abdominal or other primary forms of the disease may be present. The remaining 25 per cent of first infection types include those cases where lesions are demonstrable by x-ray and/or clinical examination and are represented by the cases of primary intrathoracic tuberculosis with acute inflammatory lesions in the parenchymal tissue and tracheo-bronchial lymph nodes, with calcified or caseous parenchymal and lymph node lesions, and with fibrotic intrathoracic lesions. Included further in this group of the pri-

mary type with demonstrable lesions are the intra-abdominal, cervical and other forms of tuberculosis\*.

The Second Infection Type of tuberculosis includes (1) the reinfection pulmonary tuberculosis or Phthisis, (2) tuberculous pneumonia, (3) miliary tuberculosis, (4) tuberculosis of other viscera, (5) bone and joint tuberculosis, (6) tuberculosis of serous membranes (meningitis, pleuritis, pericarditis, peritonitis), (7) tuberculosis of skin, (8) miscellaneous reinfection types.

The mortality of tuberculosis is approximately in inverse ratio to the age of the child during the first ten years, being especially high under two years. Brailey<sup>1</sup> observed the subsequent courses of 170 children under two years of age who were infected with tuberculosis. The mortality was 13 per cent for the 72 per cent incidence in the white children of the series and 31 per cent for the Negroes. Nearly 70 per cent of the deaths occurred within the first year of life, mostly within the first six months following discovery of the infection. Among those observed with involvement of the parenchyma of the lung, 31 per cent were dead within the first year of observation, no racial difference being noted. The mortality in those infants whose initial roentgenogram showed no parenchymal involvement was 6.8 per cent during the first year of observation. After puberty the incidence rises abruptly during the teens to a lifetime maximum in the female at 20 to 24 years, and a near-maximum in the male of the same age.

During the first year of life a high mortality from tuberculosis is noted not so much because of a marked lack of resistance at this early age as because of the large and continuous dose of infective material the young infant either inhales through constant and intimate contact with an adult case of tuberculosis or ingests by swallowing of infective material while being allowed to crawl freely about a contaminated floor.

Tuberculosis is essentially a post-natal in-

\*Read before the medical Section of the Southern Tuberculosis Conference, and Southern Sanatorium Association, Richmond, Va., September 29, 30, and October 1, 1937.

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fection, the incidence of congenital tuberculosis being so rare as to merit reporting of any such cases. In 1927 Horak<sup>2</sup> reviewed the literature for cases of congenital tuberculosis, 114 authentic and 519 doubtful cases being the result of his search. The maternal death rate is high when congenitally tuberculous infants are delivered, death of the mother usually occurring within 8 to 12 weeks after the birth of the fetus.

Infection occurs either by inhalation or ingestion in the case of either the human or bovine strain of organisms, the human strain predominating when infection takes place by inhalation. Bovine tuberculosis less rarely becomes generalized than human tuberculosis in children. Studies on human milk as a source of tuberculous infection revealed complete absence of tubercle bacilli as proved by culture and guinea pig inoculation. Petresco<sup>3</sup> in 1925 made repeated examinations of the colostrum and breast milk specimens of 31 actively tuberculous women, all of which proved negative for acid-fast organisms.

Ninety-five per cent of all tuberculous infection in childhood is pulmonary in origin<sup>4</sup>, the alveolar tissue of the lung being the site of lodgment of the infective material, facilitated by the nonciliated epithelium lining the bronchi and bronchioles. Following the initial implantation of the infection, a perialveolar irritation is produced with a secondary lymphangitis. The entire process tends to become more rapidly diffused than in the usual reinfection type of tuberculosis, where a certain degree of previously acquired resistance attenuates the growth of organisms and allows development of fibrosis and gradual repair.

Occasionally an extensive pneumonitis develops from the perialveolar irritation and the condition of epituberculosis as first described by Eliasberg and Neuland<sup>5</sup> is seen. In this condition the terminal reaction is a tracheo-bronchial lymphadenitis which persists for many months after the initially involved tissues have passed into a stage of calcification and repair.

The course of the development of the first infection tubercle was first adequately described by Parrot, Ranke<sup>6</sup>, and Ghon<sup>7</sup>, the name of the latter being usually applied to

the lesion and the entire process being known as the primary complex.

Next in importance to the respiratory tract as a portal of entry for primary tuberculosis is the intestinal tract when ingestion of contaminated foodstuffs, particularly milk, allows implantation of infective material on the intestinal mucous membrane. The bovine strain of the tubercle bacillus causes 50 to 80 per cent of primary abdominal tuberculosis.

In considering the portals of entry of tubercle infection the tonsils are probably a more frequent route than one can actually determine. The conjunctivae, nasal passages, parotid gland and skin are less important avenues of infection.

After lodgment of tubercle bacilli in the regional lymph nodes nearest the initial implantation of organisms some few organisms will migrate into the blood stream from the lymph gland focus, and remote foci of the infection may be established. When rapidly disseminating infections of tuberculosis are being transported by the blood stream the organisms may have invaded many of the remote viscera before the Mantoux test becomes positive. This is the pre-allergic stage of the disease and every negative Mantoux test should be evaluated in the light of a possible pre-allergy when clinical symptoms impress one sufficiently to suspect tuberculosis.

The Mantoux test has today almost completely supplanted all other tuberculin tests, and the 1 to 1000 dilution of tuberculin is the dilution most generally used, though many investigators feel that a suspect should not be declared non-tuberculous unless negative to the 1 to 100 dilution of tuberculin. A purified protein derivative of proved stability is now available and in general use for making the test. 0.1 c.c. of the solution of tuberculin in normal saline is injected between the superficial layers of the flexor surface of the forearm, and readings are made at the end of 48 hours. The dependability of reaction to the Mantoux test, which was first introduced in 1910, explains its popularity, since 90 to 97 per cent of all infected individuals show a positive reaction by this method. The human strain of organisms is used for testing against the human

and bovine types of infection since the tuberculo-proteins are analogous in either strain.

A positive test presents a central zone of induration and edema, with a peripheral zone of erythema. The area of edema represents the special sensitivity to the tuberculo-protein, and a reaction not presenting this edema should be regarded as negative in spite of any erythema present. The reaction of sensitivity may be of varying intensity, thereby registering the degree of sensitivity of the patient, with no indication of the severity of the infection. The Mantoux test tends to be a fixed reaction, and once the test becomes positive it usually persists as a positive of the same or a lesser degree. The tuberculin reaction is a highly specific test and the infected individual becomes so delicately sensitized to tuberculo-protein that even a very minute quantity of testing fluid will produce a maximum reaction.

In the interpretation of the tuberculin test, a negative reaction is construed as pointing to absence of tuberculosis provided that the patient is not anergic or in the preallergic state of first infection; that he is not ill with a severe hyperpyrexia infection, particularly one of the exanthemata; and that he is not overwhelmed with a severe type of generalized tuberculosis. Hart has shown that about 3 per cent of clinically tuberculous persons give a negative reaction to the Mantoux test.

A positive test indicates a sensitivity or allergy to tuberculin produced by a recent or earlier infection by the tubercle bacillus. Regarding the age of the patient when the Mantoux is first found positive, Kayne<sup>8</sup> has advanced the postulate that "in a child less than 2 years old, a positive reaction to the Mantoux test should be regarded as indicating the presence of an active tuberculous focus, unless the contrary is proved by further investigation."

Primary tuberculosis is usually a subclinical affair with a benign course. The patient may seem in perfect health and the active infection may be accidentally discovered by routine tuberculin-testing or x-ray. Slight afternoon elevation of temperature may be present with or without general lassitude, irritability, ready fatigue, loss of

appetite, stationary weight, profuse sweating, a negligible cough usually dry and seemingly reflex in origin, or minor digestive disturbances, though all symptoms are usually too mild to attract the average parent's attention. Following the initial implantation of infective material in lung or other tissue a symptomless period of invasion and incubation elapses, lasting from two to ten weeks, a tuberculin sensitivity being established during or immediately following this period. Activity of the tuberculous lesion is then at its peak and persists for many weeks or months before resolution takes place as in the case of epituberculosis or a residual in the form of a Ghon tubercle or tracheobronchial adenopathy persists. Temperature and symptoms tend to disappear many weeks before calcification or fibrosis of the acute inflammatory lesions. The appearance of temperature in conjunction with a primary tuberculous lesion usually initiates the development of allergy.

Hypertrophy of the tracheobronchial nodes may be sufficiently marked to cause irritation of nerve trunks (vagus and phrenic), producing thereby a spasmodic, brassy, reflex cough or diaphragmatic symptoms. Pressure may be exerted upon the superior vena cava causing cyanosis and edema of the face.

Because of the paucity of clinical symptoms and signs in primary infection tuberculosis, our diagnosis is dependent first on the Mantoux test and next on the x-ray findings. When doubt exists as to the validity of a negative Mantoux, x-ray examination of the chest should be made, while a positive Mantoux is a definite indication for an x-ray examination to determine the present state of the infection. If the process is arrested the x-ray evidences usually appear as tracheo-bronchial glandular infiltration or calcification with or without calcification of peripheral glands and the visible presence of the Ghon tubercle. Activity of the tuberculous process is evidenced by peribronchial infiltration or a small perifocal reaction in the alveoli, or the large shadow cast by epituberculosis, out of all proportion to the meager lung signs obtainable. By far the greatest amount of first infection tuberculosis is so mild that the shadows cast by hypertrophied tracheobronchial glands is



the only x-ray evidence of the tuberculous process.

In the young subject, expectoration is rarely practiced and the sputum is swallowed, therefore examination of the stomach washings for tubercle bacilli is valuable. The washings are treated with a 40 per cent sodium hydroxide solution for dissolving the mucus and after centrifuging and staining, examination for the organisms is made. Further corroborative evidence of tuberculous infection is obtained by intraperitoneal guinea-pig inoculations with the stomach-washings.

D'Espine's sign, the transmission of the whispered voice by the vertebral column at lower levels than is normal for the age, is helpful only in so far as it indicates the presence of a mediastinal mass resting against the spinal column, most frequently assumed to be tracheobronchial glands.

The treatment of first infection tuberculosis is largely a matter of rest and diet. Absolute rest in bed is imperative and isolation should be enforced if other children are in the family. If the allergic reaction has been marked and the x-ray findings point to marked glandular involvement with extensive peribronchial infiltration, sanatorium treatment may be advised but is rarely necessary. When positive-sputum adult cases of tuberculosis are present in the home, treatment in a sanatorium is essential.

The diet should be a high-mineral, low-fat diet containing adequate amounts of all vitamins and sufficient calories to meet body requirements, but forced feeding should not be practiced. If anorexia is marked, the milk intake should be reduced to one pint daily, and encouragement should be directed toward the taking of green vegetables in large quantities. It has never been conclusively shown that taking of large doses of Vitamin D has any accelerating effect on calcification of the tuberculous focus.

Calcium Gluconate furnishes calcium in a partly soluble and absorbable form and further exerts a desirable alkaline effect. The amount of administered calcium utilized by the human organism in the process of repair by calcification is still a debatable point, but the patient is rendered more perfect from a metabolic standpoint and tissue turgor is improved when calcium is administered. Four

teaspoonfuls of powdered calcium gluconate, representing sixty grains of calcium, are administered daily.

Tonic medication is administered as indicated by the blood picture and general condition.

In primary pulmonary tuberculosis, no form of collapse therapy is indicated.

Heliotherapy by exposure to the Alpine sun lamp is beneficial, but natural sunlight as used by Rollier is the preferred form of light therapy.

Regardless of the form of primary tuberculosis a patient develops, the treatment is essentially the same, with all efforts directed at prevention of an exogenous or endogenous reinfection or second infection form, which always presents a grave prognosis and prolonged sanatorium treatment.

The prophylaxis of tuberculosis entails the isolation of the infant and child from any tuberculous individual. The tuberculous mother should not under any circumstances come into direct contact with her offspring until every known evidence of active tuberculosis has disappeared and the child has passed the first year of life. Tuberculosis has been transmitted to children by individuals with a latent form of the disease. No servant or nurse who has ever had tuberculosis should be employed in a household where infants and young children reside.

All school teachers should be examined annually to detect the presence of any active tuberculous lesions, thereby avoiding any class-room contact with open tuberculosis. The state of North Carolina now requires every school teacher to present an annual certificate of freedom from tuberculosis and other communicable diseases.

Cooking of all foods except fruit juices should be insisted on, and investigation of the source of the food to eliminate any possible avenue of contamination should be a routine practice. State legislatures should enact laws to enforce periodic health examination of all dairymen and others earning their livelihood by the handling of raw food-stuffs. Dairy herds should be routinely tuberculin-tested at frequent intervals to eliminate infected cattle from the herd as early as possible after infection. All milk should be boiled to eliminate both human and bovine

sources of infection.

A vaccine against tuberculosis was first introduced by Calmette<sup>9</sup> and Guérin in 1924. This vaccine was prepared from an attenuated strain of bovine tubercle bacilli, and was called B C G vaccine. Injections of this vaccine were given intramuscularly and while individuals who received this vaccine seemed either less susceptible to tuberculosis or developed milder lesions when tuberculosis was contracted, this vaccine has never been in general use in the United States and Canada.

#### Comment.

Primary tuberculosis is in the great majority of children a benign infection with a good prognosis.

First infection tuberculosis will be disclosed in the vast majority of children only by use of the Mantoux test and x-ray, and every pre-school child should be tuberculin-tested at least annually beginning at 1 year of age, so that every protective measure for combating first infection forms of the disease may be promptly and adequately instituted immediately after the infection is discovered.

The weight of evidence points to an inherent tissue resistance to the first infective

dose of tuberculosis, but after the body becomes sensitized by this first exposure to tubercle bacilli it lacks the ability to meet the demands made by a subsequent second infection and the destructive lesions then progress to a more serious stage of the disease with a more unfavorable prognosis. Therefore avoidance of any possible exposure to open tuberculosis becomes our major issue in lowering the incidence of second infection tuberculosis in the child, and preventing the more serious forms of the disease.

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## "Stone walls do not a prison make Nor iron bars a cage"

WINTER is a jailer who shuts us all in from the fullest vitamin D value of sunlight. The baby becomes virtually a prisoner, in several senses: First of all, meteorologic observations prove that winter sunshine in most sections of the country averages 10 to 50 per cent less than summer sunshine. Secondly, the quality of the available sunshine is inferior due to the shorter distance of the sun from the earth altering the angle of the sun's rays. Again, the hour of the day has an important bearing: At 8:30 A. M. there is an average loss of over 31 per cent, and at 3:30 P. M., over 21 per cent.

Furthermore, at this season, the mother is likely to bundle her baby to keep it warm, shutting out the sun from Baby's skin; and in turning the carriage away from the wind,

she may also turn the child's face away from the sun.

Moreover, as Dr. Alfred F. Hess has pointed out, "it has never been determined whether the skin of individuals varies in its content of ergosterol" (synthesized by the sun's rays into vitamin D) "or, again, whether this factor is equally distributed throughout the surface of the body."

Cod Liver Oil constitutes a substitute for sunshine; it offers an effective, controllable supplement especially important because the only natural foodstuff that contains appreciable quantities of vitamin D is egg-yolk. Unlike winter sunshine, the vitamin D value of antiricketic products does not vary from day to day or from hour to hour.

Mead Johnson & Company.



## Pulmonary Abscess Secondary to Pneumonokoniosis (Silicosis)

### Report of Case; and Bronchoscopic Treatment with Recovery.

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ALTHOUGH pulmonary abscess is considered a rare complication of pneumonokoniosis<sup>1</sup>, three cases came to our attention within four months. One of these is herewith reported because it is of interest from a therapeutic, medicolegal, and industrial standpoint.

#### Case History.

The patient was a 55 year old Italian who had worked continuously as a "bench mold-er" for the past 16 years, and had paid little or no attention to the thick, black mucus which he was expectorating and blowing from his nose.

His present illness came on suddenly with severe dyspnea, weakness, dry hacking cough, slight general malaise, and pain in the left chest and shoulder. Within a week, the symptoms became so pronounced that he was forced to quit work and consult his family physician who diagnosed and treated the condition as influenza. At the end of the seventh week he was admitted to the hospital because he was coughing incessantly and expectorating one ounce of dirty-grey, foul-smelling material.

On examination the upper anterior portion of the left chest was immobile. And high in the left axilla, below the outer half of the clavicle, there was flatness with absence of tactile fremitus, breath sounds, voice sounds, and rales. The left lower lobe showed a slight impairment of resonance and diminution of breath sounds as well as rales and rhonchi which were audible on inspiration and expiration. The right lung was compensatory; evidence of cardiac abnormality was lacking; and the fingers were not clubbed. Temperature was 100; pulse 105; and respirations 25. Sputum examinations were consistently ne-

gative for tubercle bacilli.

**Roentgenogram:** A cavity with a fluid level was noted in the peripheral portion of the left upper lobe; and scattered throughout the lung fields was a diffuse nodular fibrosis. **Diagnosis:** Pneumonokoniosis and superimposed pulmonary abscess. (Fig. 1, page 15).

#### Treatment.

Weighing all the factors involved in this case, bronchoscopy and postural drainage appeared to offer most in the way of therapy. Proper postures were instituted every two hours; and throughout the course of the illness, fifteen bronchoscopic treatments were administered. In addition, the patient was given one blood transfusion and three injections of neosalvarsan.

**Result:** The abscess began to drain adequately following the first bronchoscopy, and the patient expectorated sixteen ounces of putrid pus in 24 hours. On the eleventh hospital day, after the fifth bronchoscopic treatment, the pulse rate was 80. Four days later the temperature was normal.

By the seventh week, the expectoration having decreased to 2½ ounces, the patient insisted on leaving the hospital and taking his postural exercises at home. Here his progress was satisfactory and the expectoration progressively diminished for one month. Then he had an exacerbation. There was fever, malaise, chest pain, and persistent cough. Even the expectoration increased in amount, and the foul odor reappeared.

A bronchoscopic examination and treatment were instituted at once. Immediately thereafter he experienced definite relief. The 24 hour sputum was reduced to one teaspoonful, and the cough to three times daily. From that point on, improvement was rapid, and within four weeks there was neither clinical

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nor roentgenological evidence of the pulmonary abscess (Figs. 2 and 3, page 15).

#### Discussion.

Any one who visits a foundry in the late afternoon when the molten metal is being poured cannot help but note that the air is fully laden with smoke and fine particles, and that the men are covered from head to foot with a grimey black material. These dusts, being inhaled by the molders, cause irritation of the bronchi and lungs.

In this respect, black "molder's graphite" is the chief offender. It is used upon the molds innumerable times throughout the day and invariably causes coughing. The seriousness of inhaling the "graphite" can be appreciated when one realizes that it is not graphite, but rather the trade name for a mixture which, in addition to other ingredients, contains silica and carbon.

The perniciousness of the silicosis, which ensues, is universally recognized, but that of the anthracosis is not so fully appreciated. White<sup>2</sup> says that with anthracosis, the death rate from pneumonia is nearly twice as great as where anthracosis is not present.

These dust diseases, by blocking the pulmonary lymphatics, leave their victim susceptible to acute respiratory infections which are often stubborn and prolonged. The frequency of pulmonary complications is enhanced, and the patient is less likely to recover than are people without pneumokoniosis.

#### Summary.

One case is reported of a lung abscess secondary to pneumokoniosis in a 55 year old iron molder. The abscess healed after fifteen bronchoscopic treatments.

Despite the contestations of the insurance carrier, The California Industrial Accident Commission recognized the industrial relationship of the abscess to the pneumokoniosis, and awarded a decision in favor of the patient while the pneumokoniosis was still in a comparatively early stage.

This decision of the commission was in keeping with the most advanced type of preventive medicine, making it unnecessary for the patient to return to his former hazardous occupation, and allowing him to rehabilitate himself before becoming completely incapacitated.

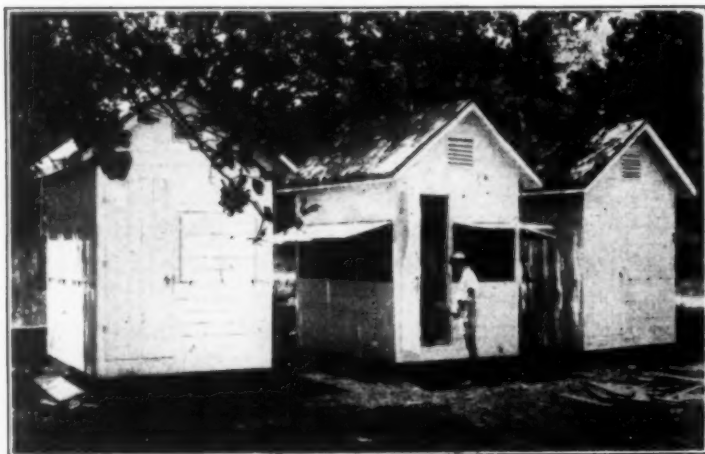
#### Conclusions.

1. Molding is an industrial hazard.
2. Molder's graphite, which is used in this work, contains silica and carbon, and produces pneumokoniosis.
3. Pulmonary abscess is a more common complication of pneumokoniosis than the medical literature indicates.
4. These complicating abscesses should be classified as industrial and compensable.

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## Necessity is Mother of Invention



When the Sussex County Health Department of Virginia was established in April, 1936, it promptly was appreciated that pulmonary tuberculosis still was one of the outstanding problems in that jurisdiction. The deaths during that year totaled twenty-three. Crowded and insanitary living conditions and ignorance of the cause and control of tuberculosis, coupled with a lack of funds, all have played important parts in the destructive power of this disease in that county.

Funds were insufficient to place all the open active cases in the state sanatoria, even had ample facilities existed. Consequently, it was decided to erect small one-room portable screened cottages of the Burr type. — Va. Dept. Health Bulletin.

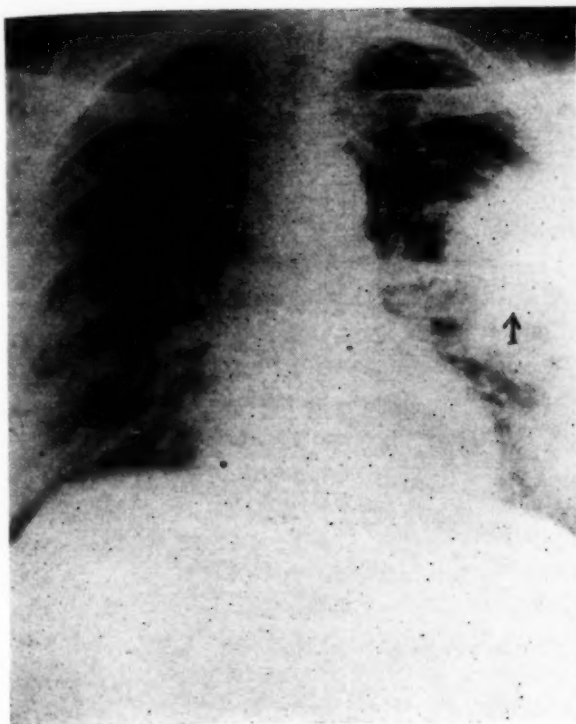


FIG. 1.  
Peripheral Lung Abscess Secondary to  
Pneumonokoniosis.  
(Roentgen interpretation by Dr. John O'Neill).

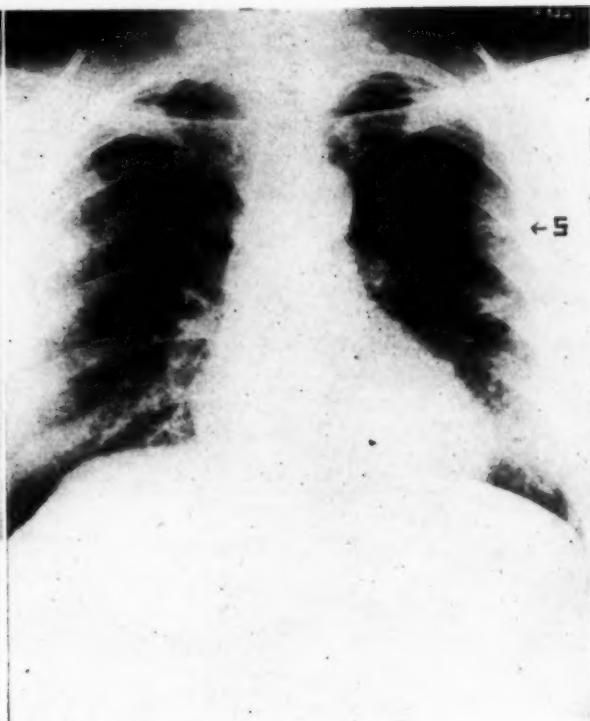


FIG. 2.  
Chest Film After Bronchoscopic Treatment. The  
fibrosis and mottling of the pneumonokoniosis  
persist. S-Horizontal scar at site of former  
abscess.  
(Compare with Figure 3).

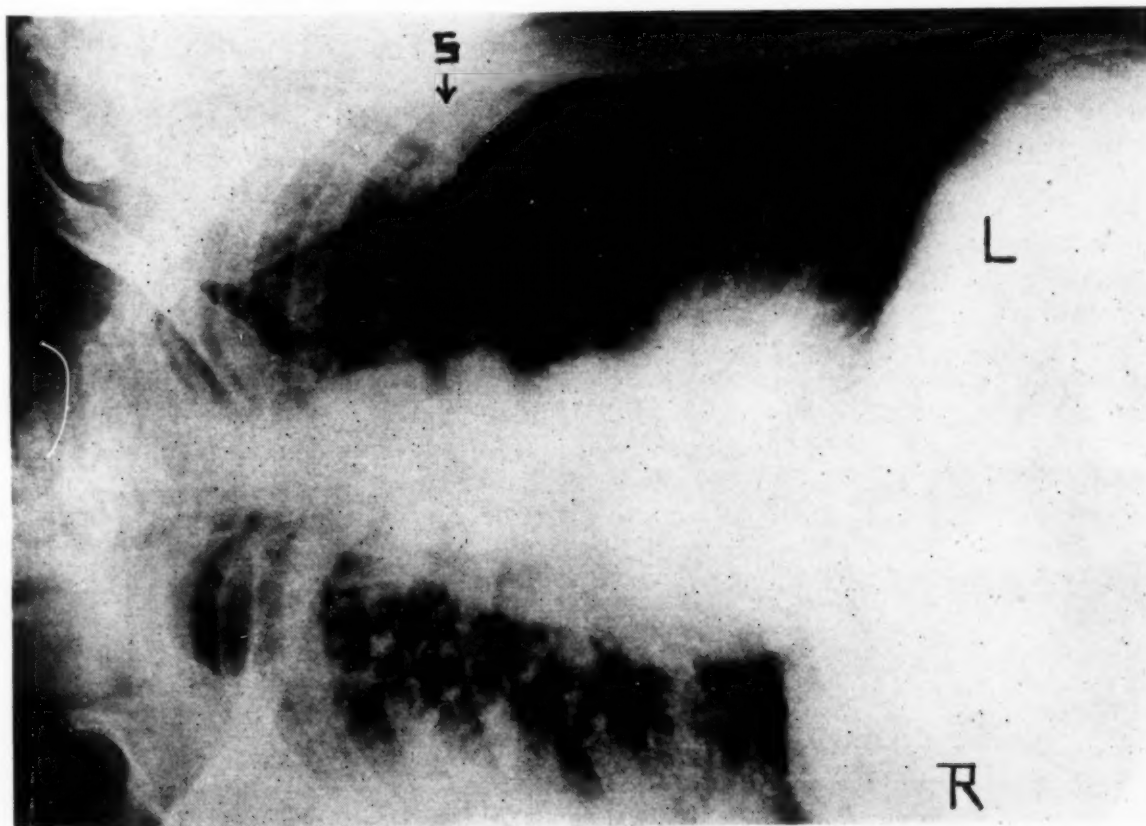


FIG. 3.  
Film Made in Horizontal Position.  
S-Scar of healed abscess.



## Artificial Pneumothorax\*

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THOSE creative sparks that glowed then burned in the mind and soul of James Carson over one hundred years ago, and subsequently fanned into flame in the breasts of Carlo Forlanini, Brauer and John B. Murphy; augmented by the pioneering achievements of a small group of investigators to follow; have given mankind one of the greatest boons in his struggle with sickness. This contribution is the treatment of diseased lungs by the injection of air into the pleural cavity—artificial pneumothorax. Pneumothorax has revolutionized the whole tuberculosis problem. How it has offered hope, relieved distressing symptoms and rolled back the curtain of gloom from the despairing advanced cases; how it has so quickly, and oft times miraculously, converted the sick toxic patient into a symptom free one; how it has furthered the early rehabilitation to a normal, useful life, and how it has so sharply and materially reduced the long period of hospitalization; is probably well known to most of you. To pneumothorax goes top honors in that brilliant chapter in the annals of Tuberculosis which has so recently been written, and is to-day in the writing—the chapter of collapse therapy. It is a well established and general rule that no other form of collapse therapy be applied until pneumothorax has been strongly considered or a trial with it has proved adequate. The statement has been made, and I think very probably a true one, that at sometime in the lives of all persons who died from tuberculosis, they could have been saved by pneumothorax. Perhaps the prophetic utterance that we shall have the universal application of pneumothorax in tuberculosis may come to consummation. True it is at the present time that there is a strong trend toward its employment in minimal lesions.

As has been intimated, pneumothorax has its wide, its chief, its notable application in the tuberculosis field. It has been used, however, with varying success in other condi-

tions. Lung abscesses have responded to pneumothorax treatment, particularly when the abscesses are centrally located and freely draining into a bronchus. When employed otherwise in this disease, lung rupture and empyema are invited. An occasional case of bronchiectasis, when unilateral or predominantly so, has been considerably benefitted. I must emphasize, however, that this applies only to the occasional case. In pleural effusions, the effusion may be converted into, and maintained, an air pressure medium. It is a most valuable aid in removing large quantities of fluid in massive and rapidly forming effusions by exerting a counter pressure during the withdrawal. It may be used as a diagnostic aid, especially in differentiating extra-pulmonary from intrapulmonary conditions. As a preliminary to a diagnostic thoracoscopy and at times to surgical procedures within the thorax, it serves a useful role. Rarely in cases of fungus and neoplastic effusions has it been of value. Pneumothorax has been tried more or less experimentally in pneumonia, and some observers have reported a shortened clinical course and marked relief from pain. Others, with whom your essayist is in agreement, believe that pneumothorax in pneumonia does not rest upon an altogether rational basis, and may be fraught with danger. Time will tell; and until then I would advocate, as will be my own practice, reserving the consideration of pneumothorax in pneumonia to a strictly experimental basis.

The mode of action of a pneumothorax upon a tuberculous lesion in the lung has been extensively debated; and has given rise to some high sounding and complex theories. Most workers, however, feel that it is to a large extent a mechanical one. The lung is converted from an air containing organ alternately expanding and contracting twenty to thirty times per minute, to a partially or completely solid one which is in a large measure immobile. The lung is put at local rest. Open cavities are pressed closed and held there. The products of exudation are

\*Read at the Southern Tuberculosis Conference, Richmond, Virginia, September 29, 1937.

squeezed from the air containing soft parts into the draining bronchi. By the compression of the small bronchi and alveoli, and by the immobilization of the whole lung, extension of disease by the aspiration of sputum and blood into the healthy parts of the lung is deterred or prevented. The small blood vessels, capillaries and lymph vessels are compressed with a resulting lymph and venous stasis. In this manner absorption from the diseased areas is reduced and fibrosis initiated. A sharp fall in the temperature, a marked reduction in the cough and expectoration, and a very noticeable alleviation in the toxemia is often observed after a few refills. An improvement in a lesion in the contra-lateral lung is frequently and gratifyingly noted. The transmitted counter pressure together with the proved hyperemia of this lung may account for it. It is obvious that a too advanced disease in the contra-lateral lung may readily be aggravated.

Since the general adoption of collapse therapy, and this would be encompassed within the past two decades; the indications for its use have shown wide excursions. Formerly, the indication for collapsing a lung was an extensive, progressive disease in that lung with very little or no involvement in the other one. This is still considered by many the ideal indication. Enriched by experience, emboldened by pioneering ventures, we have to-day a wide range for its application. This extends from collapsing the minimal infiltration at one extreme, to the bilateral collapse for extensive disease in both lungs, at the other. Each case should be considered an individual problem, and the decision for collapse therapy should rest with the judgment and experience of the physician in charge. The case of minimal tuberculosis with a negative sputum usually responds satisfactorily to the rest cure alone. If after a reasonable period of expectant treatment examination showed a progression, or lack of retrogression, of the disease; then pneumothorax should be induced. It is my feeling that any minimal lesion with a positive sputum should be placed on pneumothorax at once, or after a most brief delay. Too much delay in these cases will find a rapid spread of the disease, the formation of adhesions, and the golden opportunity for

treatment lost. It is at these times that we are forcibly brought to the realization of that lament—"If our foresight were only as good as our hindsight." As a general rule, every case of pulmonary tuberculosis with a positive sputum calls for some form of collapse therapy, unless there is some special contraindication, or the case is obviously hopelessly advanced. Stivers aptly writes "Cases with positive sputum that recover without collapse therapy are few, and these usually require many years of Sanatorium treatment."

The time for this presentation does not permit my going into detail in considering the indications for pneumothorax treatment in pulmonary tuberculosis. I shall, therefore, only enumerate the outstanding ones. The indications are: a progressive minimal lesion not responding to bed rest alone; unilateral lesion greater than minimal without cavitation; any predominantly unilateral disease with positive sputum or a demonstrable cavity; unilateral pneumoic phthisis; pulmonary hemorrhage, if the lung from which the hemorrhage comes can be determined; tuberculous pleural effusion; spontaneous pneumothorax; bilateral disease with an active lesion in one lung and an inactive or arrested lesion in the other; bilateral stationary cases or bilateral disease with soft thin-walled cavities in the better lung; and finally, to improve the contra-lateral lung preparatory to a thoracoplasty on the other side. By employing either the alternating or simultaneous bilateral pneumothorax, the scope of attack on advanced tuberculosis has been tremendously enlarged.

Contra-indications for pneumothorax therapy have naturally narrowed during recent years as the indications for it have widened. Formerly, laryngeal and intestinal tuberculosis were very definite contra-indications. They should be considered so only when progressive and interfering with nutrition. It is a common observation to note marked improvement in these complications with the improvement of the pulmonary condition. Severe diabetes has been considered a contra-indication for pneumothorax; but with the advent of insulin, a controlled diabetes is no longer so. Cardiorenal disease, extensive emphysema and severe asthma are absolute contraindications. Pregnancy seems

to be no contra-indication, and it is interesting to note in this connection, that as a result of the beneficent effect produced by the upward pressure of the gravid uterus; we now have in our therapeutic armamentarium for far advanced bilateral pulmonary tuberculosis, pneumoperitoneum. Individuals past middle age do not as a rule tolerate pneumothorax well. There are exceptions to this of course, and we all have them. Other unfavorable factors, when contemplating pneumothorax treatment, are: the presence of adhesions or thickened pleura, unusually large or thick-walled cavities, extreme emaciation, high fever, a marked diminution of vital capacity and a severely neurotic state.

Every pneumothoracist knows that the chief hindrance to the successful induction of pneumothorax is pleural synthesis. Even in the face of roentgen evidence, however, a trial to obtain air space should be made. Not infrequently a most creditable pneumothorax will result when the evidence would declare otherwise. Conversely, not uncommonly pleural adhesions will prevent obtaining satisfactory space when there seemed little or no indication of their presence. It behooves one, therefore, always to make the attempt when the induction of a pneumothorax is desired. A partial or incomplete pneumothorax may produce a highly satisfactory clinical response. Under continued inflations, adhesions will sufficiently stretch, in many instances, to permit the closure of cavities. In other instances, these adhesions may be of the nature to permit the conversion from an inefficient to an efficient collapse by an intrapleural pneumolysis.

As with most therapeutic measures, there are some complications attendant upon the use of artificial pneumothorax. By and large, however, these are relatively few. To reject the application of this valuable method because of them is invalid. Matson estimates that less than 2 per cent of the deaths in his cases were directly or indirectly due to complications. Again, time permits little more than mention of the major ones. Probably the most alarming and serious of the complications is the air-embolism-pleural shock syndrome. There is much confusion in differentiating between embolism and pleural shock. Perhaps it would be expedient to con-

sider all the fatal cases and those showing focal neurological phenomena embolic, and the remainder in this group due to shock. These complications are most often encountered where adhesions and obliterative pleuritis preclude a good collapse. Meticulous care on inserting the needle, close attention to the manometer and the careful observance of the patient's facial expression during the injection, will avoid in a large measure this unhappy occurrence. Fluid forms at sometime in the course of pneumothorax treatment in the majority of cases. In most instances it is small in amount and spontaneously disappears. At other times it may reach a point requiring aspiration and air replacement. Then again it may become sero-purulent, or purulent, or a frank tuberculous empyema may intervene. This development, of course, calls for active energetic treatment—aspiration, irrigation, oleothorax or perhaps surgery. Spontaneous pneumothorax may occur, and unless followed by—and it frequently is—a purulent exudate, gives little trouble. I have on a number of occasions seen it convert a poor into an excellent collapse. When it occurs in bilateral pneumothorax, which it does so often, it becomes a very serious thing. Interstitial emphysema occurs, and when superficial is of little consequence. The deep variety invading the mediastinum may produce most alarming symptoms and even death. Marked displacement of the mediastinum and mediastinal hernia are seen; but proper management with attention to the intra-pleural pressure, usually takes care of them quite satisfactorily. In rare instances, a low tension pneumothorax is induced on the other side. One of the disheartening occurrences, and one that calls for all the resources at our command, is the rapid and at times devastating, spread of disease in the other lung. I have in a previous paper referred to this under the title "The Tragedy of the Contra-Lateral Lung." Every operator, I am sure, has seen a number of patients show a reaction, for no apparent reason, following the refill. It is characterized by fever, aching and general malaise, and lasts a few to several hours. I have heard no really satisfactory explanation for this, but it must be an auto-inoculation phenomenon of some kind.



The best index for determining the end results of pneumothorax treatment, in my opinion, is that of sputum conversion. A decrease in cough and expectoration, the absence of fever, a gain in weight and a general sense of well-being, are all most assuring that your patient is headed in the right direction. If along with these signposts of improvement the sputum is negative and remains so, then the picture is complete and you may know that all is well. A positive sputum, however, portends evil, and speaks for trouble lurking ahead. An open cavity may be obscured by the pleural thickening so common in these cases; but with the further development of Tomography—making x-ray exposures at varying depths within the lung—these may be revealed more and more. The sedimentation rate gives helpful clues in following a patient's progress. Some patients terminate their pneumothorax with a fibrothorax, and I have found it to be an acceptable termination. There is surprisingly little dyspnoea and the occasional associated bronchiectasis is not troublesome. How long to maintain a pneumothorax, when not prematurely interrupted by an obliterative process, is largely an individual problem, and depends a great deal upon the amount and character of the original lesion. An optimum general average would be one to three years in the mild and moderate cases and three to five years in the severe. Crushing the phrenic nerve at the termination of the pneumothorax is often a useful move and helps in some degree to insure that patient's future welfare.

Any one performing artificial pneumothorax must not only understand the method itself; but must also have a knowledge of tuberculosis from a pathological, clinical and roentgenological standpoint. It is needless to burden you with the detailed technic of the treatment. I wish to emphasize only a few of the salient points, and some of those which I have found of value in my own experience. Rubber gloves, sterile sheets and towels, and painting large areas with antiseptic solutions are, I believe, absolutely unnecessary. Almost a daily experience of over fifteen years, with thousands of refills performed, emboldens me to make this statement. The position of the patient on the table is important. I have the patient's chest

arched over a firm pillow with the head low. Such position stretches the ribs apart and discourages embolism. I strongly decry against the upright or sitting position which I understand some operators employ. A blunt needle, of course, should be used for the initial refill to avoid penetrating the lung. A small nick in the skin with a scalpel may be an aid. I do not subscribe to the routine use of the scalpel for refills as this unnecessarily scars up the skin surface. For refills I prefer a sharp small-caliber needle as it produces less pain and permits of greater delicacy of touch. Strapping the chest after the refill, except in strongly positive pressures, is not only needless but adds to the patient's discomfort. I close the puncture hole with a drop of liquid collodion. For an anesthetic I have employed two cc. of a 2½ per cent novacaine for a number of years. This seems decidedly preferable to using many cc. of a weaker solution, which makes the tissues boggy and obscures the guiding landmarks. Injecting the anesthetic in short, quick forceful spurts at the initial refill is extremely helpful in separating the pleurae, and perhaps factors in preventing the air embolism-pleural shock complex. Satisfactory pneumothorax treatment cannot be carried on without fluoroscopic control, and no one should engage in it where this is not available. The ideal is to fluoroscope the patient before and after each treatment. It has been my custom during the past year or so to inject 1 to 3 cc. of azochloramide oil with the very first appearance of fluid. It is my feeling that it serves an abortive effect. The question of the interval between refills, and the quantity of air injected is purely and strictly an individual affair, and is to be determined by the manometric readings, fluoroscopic examination, the clinical picture and the general response toward the desired objective.

Now in conclusion, may I sound an appeal for gentleness in technic. It behooves us to be gentle and easy. These unfortunate patients have to be subjected to this treatment every few days to weeks down through the years. They may, and frequently do, get needle shy. If you wish to view this from a selfish angle, then by exercising these refinements you may get patients from surrounding districts where able but rough operators abound. After all it is nice, to be nice.

## Some Pitfalls in the Diagnosis of Silicosis

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A REVIEW of the rapidly accumulating literature on silicosis reveals numerous contradictions and misconceptions regarding certain phases of silicosis. While the reader notes a general agreement existing among the writers as to etiology, pathology, symptomatology, and the ineffectiveness of treatment, he is at the same time aware that a confusion exists concerning the diagnosis of silicosis.

The purpose of this paper is to point out possible pitfalls into which the inexperienced physician can be lured in arriving at a diagnosis. These pitfalls can be avoided if all procedures, upon which the diagnosis of silicosis is based, are carefully analyzed and interpreted in relation to each other rather than evaluating them separately.

It is generally agreed that a diagnosis of silicosis should be based upon:

- (1) History.
  - a. Prolonged exposure to a dusty atmosphere containing a high concentration of silica, the individual particles of which being less than ten microns in diameter.
  - b. Symptoms, such as dyspnoea, dry cough, and pain in the chest.
  - c. Lack of toxemic symptoms.
- (2) Physical examination of the patient.
- (3) Fluoroscopic and roentgenographic examinations of the chest.
- (4) Macroscopic and microscopic examinations of the lungs.
- (5) Chemical examination of dried lung tissue for determining the amount of silica.

### (1) History.

The occupational history of the patient should reveal the type of dust exposed to, the atmospheric concentration, the silica content of that dust, the size of the particles, and the length of exposure. In routine examinations in dusty industries this information is not impossible to obtain and when elicited is of definite aid in the diagnosis.

However, in the office, dispensary, and hospital practice it is frequently impossible to acquire these facts since many of the victims know very little about the composition of the dust which they have inhaled. Difficulties either arise from the fact that many of the employees in the dusty industries are foreigners who are unable to speak the language, or that some employees give a history of having been exposed to more than one dust in more than one industry, or finally, that any attempt to obtain accurate information from industry through the patient alone or with the aid of social agencies nets negative results because of the fear on the part of industry of possible medico-legal complications. Obviously such an inadequate history of dust exposure loses its significance as an aid in the diagnosis of silicosis.

One must guard against many pitfalls in the evaluation of symptoms given by the patient. The tendency to exaggerate the complaints in medico-legal cases is well known to the experienced physician. In many instances the multiplicity and severity of complaints of the patient have their origin in the office of the ambulance chaser. Early silicosis does not produce disabling symptoms and for this reason patients with early disease are seldom seen in the hospital, dispensary, or physician's office.

Early silicosis is usually discovered in the course of routine examinations of employees in dusty industries and the diagnosis is generally based on the known history of exposure and on serial x-ray films. Manifestations of moderately advanced and advanced silicosis are such symptoms as increasing dyspnoea, cough, and pain in the chest—complaints which cause the patient to seek medical advice. In these stages the physical findings are more pronounced, the exposure history quite definite and the roentgenograms usually reveal a bilateral nodular fibrosis which is quite often more pronounced on the right side. When a patient presents dyspnoea as a prominent symptom and the physical and x-ray examinations fail to re-

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veal pathology consistent with a silicosis despite a positive exposure history, one must search for possible bronchial asthma, emphysema, cardiac disease, bronchogenic carcinoma with obstruction, or any condition that will cause an obstruction of a bronchus leading either to an obstructive atelectasis or an obstructive emphysema. The writer has been baffled by so-called typical histories and symptoms only to find that the actual cause of the complaints was not silicosis, but one of the diseases just enumerated.

Haemoptysis is not a common complaint, but it does occur in some silicotics. It is generally believed that when this symptom manifests itself it is due to an associated tuberculosis. The accuracy of this belief must be questioned since it is not always confirmed by autopsy. In a previous communication the writer<sup>1</sup> has reported cases with haemoptysis in silicotics, yet autopsy material of the same patients studied bacteriologically and histologically failed to reveal evidence of tuberculosis or any other infectious process in the lungs.

## (2) *Physical Examination.*

The writer believes that the physical examination as an aid in diagnosis has been underestimated probably because its value in the diagnosis of silicosis is still a controversial subject which is clothed with misconceptions. For instance, A. E. Russell<sup>2</sup> and co-workers state, "The diagnosis of silicosis by means of the x-ray alone is comparatively easy when the condition is fully established, while the physical examination is of more importance when the disease is in the incipency because x-rays do not indicate early fibrosis as well as that which has existed longer and is of greater density." On the other hand, Edgar Mayer<sup>3</sup>, in a relatively recent paper states, "The physical examination helps little inasmuch as the abnormal findings are those peculiar not to silicosis, but to general pulmonary fibrosis with emphysema." From a review of the literature one is inclined to the belief that on the whole the greater emphasis is placed on the fact that the physical examination of the chest yields negative results. Some of the misconceptions lie in the contention that the simple silicotic chest is a dry chest and emphase-

matous in shape. Little emphasis is placed on the fact that the silicotic chest is one with bilateral limitation in expansion and is not necessarily barrel shaped. One often encounters third-stage silicotics with marked limitation in expansion of their chests showing negligible clinical evidence of emphysema. In the writer's experience, the silicotic chest more often presents evidence of bilateral diminution of expansion than any other physical sign. While this cardinal sign is not as a rule noticeable in early silicotics, it is quite definite in the later stages. Tactile fremitus is generally diminished or absent over the involved areas. Diminished resonance to definite dullness on percussion is first noticeable at the roots of the lungs. As the disease progresses the percussion note becomes increasingly duller from axillary region towards hilum, especially anteriorly. It is not uncommon to find a slight hyperresonance to percussion at the extreme apices and bases of the lungs except when the diaphragm is elevated by adhesions in the latter instance.

The outstanding auscultatory finding is a general softening or mild suppression of breath sounds over the involved areas. A prolongation of the expiratory note is frequently noted. At times the breath sounds may have a rough and harsh characteristic. Occasionally a few sibilant and sonorous notes may be heard usually in advanced cases. Persistent localized posttussive rales in axillary region and in first and second interspace have been heard by the writer for as long a period as five years in one patient with third stage simple silicosis in whom autopsy failed to reveal any evidence of tuberculosis<sup>1</sup>. Bronchial breathing is not infrequently heard in silicosis complicated by tuberculosis.

In summary it may be stated that the most constant physical findings in simple silicosis, in addition to the diminution of expansion of the chest, are dullness on percussion especially in the region of the middle two-thirds of both lungs and a softening and diminution of the breath sounds over the involved area.

From the viewpoint of differential diagnosis, it must be remembered that the physical findings are not by themselves pathog-



nomonic of silicosis since lung abscess, cancer of the lung, thickened pleura, elevated diaphragm and atelectasis may present the same percussion and auscultatory findings. However, when a patient who complains of dyspnoea presents, on physical examination of the chest, the essential physical findings as discussed above, silicosis should be suspected and inquiry should be made as to possible exposure to silica. The clinical impression should then be confirmed with a roentgenogram.

### (3) Fluoroscopy.

The fluorscope is of value in diagnosis of silicosis since it may reveal a diaphragm which is limited in motion, adherent, and tented. It may also reveal an increase in aeration at the bases because of compensatory emphysema and diminished expansion of the inner middle two-thirds of lungs because of the predominating fibrosis.

### (4) Roentgenogram.

The roentgenogram in the later stages of the disease is almost diagnostic of the condition in many instances. In early silicosis, however, the roentgenographic findings are not at all pathognomonic since the same findings may be found in passive congestion of the lungs, bronchitis, asthma, fungus disease and bronchiectasis. Simple silicosis in the second or third stage may reveal a uniform characteristic bilateral nodular fibrosis, the nodules being rather discreet in size, appearing in the middle two-thirds of both lungs and diminishing in number toward the periphery. In this stage, miliary tuberculosis, bronchopneumonia and metastatic carcinoma must be ruled out. In the stages of conglomeration, consolidation and diffuse fibrosis in general, the x-ray picture is less typical since other lung diseases will simulate the condition. In silicosis with infection the roentgenogram becomes even more complex and one finds greater difficulty in diagnosing the disease on account of the masking of the silicotic process by the complicating pathology which may be tuberculosis, pneumonia, lung abscess or emphysema.

In long standing silicosis with marked

pleural thickening the diagnosis is most difficult to make since the underlying pathology cannot be visualized with the usual exposures, and special x-ray techniques are necessary to show the underlying silicotic process. The writer has seen such cases at the autopsy table where the true condition was first recognized.

It is obvious from the above discussion that even the roentgeogram which by itself is the greatest single aid in the diagnosis of silicosis is nevertheless by itself not diagnostic of silicosis.

### (5) Laboratory.

The various laboratory tests for silicosis such as sputum, blood and urine examinations are not of diagnostic value. The two post-mortem specific diagnostic laboratory tests are of academic and medico-legal interest only. After the death of the patient, the macroscopic and microscopic examinations of the lungs will reveal the presence or absence of silicosis. The chemical examination of the dried lung will determine the amount of silica per gram of dried lung, the normal, according to McNally<sup>4</sup>, varying from 1.13 mg. to 2 mg.

The question that arises, namely, can silicosis be diagnosed in the early stage, can be answered in the affirmative, provided all facts are taken into consideration. The common practice of making a diagnosis merely on the roentgenogram alone or on the history of exposure to silica alone cannot be too strongly condemned.

In summary it may be stated that there is no pathognomonic symptom, sign or x-ray shadow in silicosis that cannot be simulated by other diseases. Therefore, all factors must be considered in making a diagnosis of silicosis. The committee appointed by the American Public Health Association for the purpose of studying the roentgenological appearances in silicosis and the underlying pathological lesions makes the following statement in its report<sup>5</sup>: "Only the physician who has examined the subject, has obtained an occupational history of any adequate exposure to silica dust, and has before him a suitable roentgenogram of the chest, should make the diagnosis of silicosis. The roent-

genologist not in possession of these facts, can merely state whether the shadows which he sees in a film are consistent with his diagnosis."

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## Some Problems in the Management of Tuberculosis

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THE problems of the management of Tuberculosis are many and could not all be enumerated in this article. Each case reverts to itself and must be cared for and managed individually, however, there are some points that apply to all cases in a general way.

The average layman, regardless of intelligence, education, and social standing has some knowledge of various diseases common to mankind but knows practically nothing concerning Tuberculosis and has little desire to become informed about the disease. Much has been accomplished but still the great problem is education which applies not only to the patient and the patient's family but also in the co-operation of the general physician and various specialists.

Ever since the day of Hippocrates, Tuberculosis has been a dreaded disease and naturally when a diagnosis is given it is a stunning blow and only correct knowledge can establish the assurance and courage necessary to make a cure. An individual is only human and when told he must stay in bed months and even years he looks for a short way out, even though he has the utmost confidence in his physician. He believes what he likes to believe until he has learned his A B C's from bitter experience or from fellow patients.

Home treatment in the beginning is only to be mentioned to be condemned, and hospitalization should be insisted upon if the cost is not prohibitive to the patient. The anxiety of the family and the idle curiosity

of visitors do much to retard progress and an already upset patient becomes bewildered receiving so much conflicting advice. The only way to effect a cure is to live correctly. It takes time for certain necessary facts to be instilled and realized, and most certainly, a hospital is the only place where proper routine can be carried out under the supervision of trained physicians and nurses. After a patient has received sufficient and proper training he makes a wonderful patient but without it a cure can never be expected.

Since Tuberculosis is the leading cause of death between the ages of 18 and 35 years, it would seem that more physicians, both general practitioners and specialists, would become interested and better informed in the diagnosis and treatment of the disease. Any physician can become his own T. B. Man if he will become interested in the disease and as Lawrason Brown has so truthfully stated, bear the disease in mind.

It is the duty of the general practitioner, in most cases, to supervise the care of the patient and the prevention of the spread of the disease. At the present time ample opportunity is given to the medical profession at large to receive training in all the T. B. Hospitals and the Staffs of these hospitals are not only competent but gladly give this time freely to be of service in a constructive way.

In the last few years the medical profession has had many problems to combat, and much has been placed on the shoulders of the general man. Tuberculosis by no means

has been a small problem.

It is, therefore, desirable that the physician in the general practice of medicine should avail himself of the essentials in the modern methods of diagnosis and treatment of tuberculosis. This would enable him to better manage the tuberculous patient and he would in turn, gain the confidence of the patient and his family.

Diagnosis is, of course, of paramount importance but when a diagnosis is made the real fight has only begun. Not only does the adult patient have to be taken care of and advised properly but contacts in the home must be educated and a rigid discipline maintained to prevent spread of the disease. Contacts of children are most important.

Our children are our dearest possession, not only from the standpoint of filial love,

but also from the economic value of the future welfare of the nation. It is needless to state that a sound body must accompany a sound mind to accomplish ideal in manhood and womanhood. There are numerous health problems in childhood, important all of them, but Tuberculosis is one that cannot be stressed too forcibly. We spend yearly for education in the United States over two billion dollars or fifty times as much as for child health work in all its phases. Most certainly it should be as necessary to have health as education. The children of today are to be the men and women of tomorrow and Tuberculosis, knowingly or unknowingly, plays an important part in their lives.

What can be the objection from a Tuberculosis standpoint of having a healthier citizenship for tomorrow?

## New Sanatorium Buildings

A CONTRACT has been let for the construction of a new tuberculosis hospital at the Dalles, Oregon. A Portland firm was low bidder with \$158,000. The project includes plans for a heating plant, laundry, and physician's cottage.

The voters of Lake County, Illinois have voted to erect a tuberculosis sanatorium for Lake County with tax revenue to be collected over a period of 10 years starting next summer. Dr. Charles K. Petter of the staff of the Glen Lake Sanatorium, Oak Terrace, Minnesota, has been appointed as medical director and he will supervise the construction of the sanatorium shortly to be erected. It is expected that he will take office soon after the first of the year.

Federal funds have been granted to aid in the construction of a tuberculosis sanatorium for the State of Idaho. A site for the hospital has not yet been selected.

It is announced by the Board of Control of the State of Nebraska, that a new wing for men will be built at a cost of \$125,000 to increase the bed facilities of the State Tuberculosis Hospital at Kearney. The building will increase the hospital's capacity by 40 beds, and will include an operating room and x-ray unit.

The cornerstone was laid at the State Tuberculosis Sanatorium at Hamburg, Pa.; for the erection of a new surgical unit. This unit will serve the other state sanatoria, located at Cresson and Mont Alto. Dr. Moses Behrend, Chest Surgeon, of Philadelphia, will be in charge of the surgical unit.

It is planned to build a new sanatorium at Butler, for 550 patients, to increase the bed capacity at Hamburg for 200 patients, and to build a new children's hospital and a new building for adults at Mont Alto.

## THORACIC INSTRUMENTS

We make and illustrate what we believe to be a complete assortment of instruments designed and used by the leading thoracic surgeons, including those for lobectomy, phrenicectomy, thoracoplasty, thoracoscopy, pneumolysis, and kindred techniques.

We show foreign as well as domestic models and solicit your inquiries.

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This city is among the pioneers specializing in tuberculosis healing. The record of ASHEVILLE specialists in this branch of medicine is impressive. The records of health regained here is attested by hundreds of active business leaders now in ASHEVILLE, and by hosts of men and women throughout the nation.

We invite the medical profession to study what Asheville can do for their patients. Sanitaria data free upon request.

CHAMBER OF COMMERCE  
Asheville, N. C.

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For the treatment of tuberculosis and chronic Diseases of the Chest.

MEDICAL STAFF:

S. L. CROW, M.D. J. W. HUSTON, M.D.  
Mrs. W. I. ABERNETHY, R.N., SUPERINTENDENT  
ASHEVILLE NORTH CAROLINA

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ASHEVILLE

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ASHEVILLE Reasonable Rates NORTH CAROLINA

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A thoroughly equipped institution for the modern medical and surgical treatment of tuberculosis. An especially constructed unit for thoracic surgery. The most recent advances in pneumolysis applied to those cases demanding this branch of intrathoracic surgery.

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"Radiographic, Fluoroscopic, and Pneumothorax service." New, distinctive, Individual Bungalows... highly modern; also Private Rooms with baths and sleeping porches...all equipped with radio... Beautiful grounds...Moderate Rates.

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## OBITUARY

## DR. LAWRASON BROWN



THE tuberculosis world lost one of its most magnetic leaders in the death of Dr. Lawrason Brown on December 26th. Dr. Brown developed pulmonary tuberculosis in his final year at the Johns Hopkins University Medical School in 1899. He came to the Trudeau Sanatorium under the care of Dr. Edward Livingston Trudeau and on his recovery in 1900 he joined the staff of the institution as assistant resident physician. He was resident physician from 1901 to 1912 when he retained the position of visiting physician and later consulting physician while conducting his private practice in Saranac Lake.

Dr. E. L. Trudeau gave Dr. Brown credit for the modernizing of the Trudeau Sanatorium where he developed the laboratories and the excellent system of records. He helped to inaugurate the Trudeau School of Tuberculosis in 1916 and his wonderful gift in lecturing made him with Dr. E. R. Baldwin a leading light in the school.

Dr. Brown was an exceedingly prolific writer in the field of tuberculosis. His "Rules for Recovery from Tuberculosis," a handbook for the lay patient, went through a number

of editions and was very popular with patients. His best original work was on intestinal tuberculosis, the diagnosis and treatment of which was definitely established with the publication of "Intestinal Tuberculosis" which he wrote with Dr. H. L. Sampson. He and Dr. F. H. Heise wrote the "Lung and Tuberculosis." For years he has been associate editor of the American Review of Tuberculosis. He founded at the Trudeau Sanatorium the Journal of the Out Door Life which was first published at the Sanatorium and was very popular among patients suffering from tuberculosis throughout the country. He contributed the chapter on tuberculosis in a number of textbooks and his bibliography runs into hundreds of articles.

Due to his wide experience in this field Dr. Brown was constantly called upon for advice and assistance. Since 1926 he has been consultant to the Waverley Hills Sanatorium at Louisville, Ky. He was a member of the Board of Trustees of the Trudeau Sanatorium, the New York State Hospital at Ray Brook, the Potts Memorial Hospital at Livingston, N. Y., and of the Advisory Council for the Phipps Institute of the University of Pennsylvania, Philadelphia. He was president of the American Clinical & Climatological Association in 1920, of the American Sanatorium Association, of which he was the founder, from 1919 to 1923 and of the National Tuberculosis Association in 1922. The National Tuberculosis Association awarded him the Trudeau Medal in 1933 in recognition of his achievements in the study of tuberculosis. He received the honorary degree of Doctor of Science from Dartmouth College in 1931 and from the Medical College of Virginia in 1936.

His interests were many: Preeminently a physician, he was loved by his patients; an inspired teacher, he was proudly acclaimed as master by phthisiologists throughout this country and many others; a writer of distinction, his ideas have been accepted in many parts of the world; an administrator, he organized the work of the Trudeau Sanatorium and made this pioneer institution a model to follow; as an advisor his ideas have fathered much of the research that has come out of Saranac Lake and Trudeau; a profound student of history, he has made the medicine of the past a living subject; a cultured gentleman, he fostered an interest in literature and art in all whose lives he touched; as a friend he had no equal.

—John N. Hayes, M. D.

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A Private Sanatorium of the Highest Class. Very modern inclusive rates with no extra charges. Fully approved by the American College of Surgeons. Unusual refinements of service. New and modern buildings and equipment.

A CONVALESCENT SECTION for non-tuberculous convalescents.

Circulars on request: **DR. GEORGE THOMAS PALMER**, Medical Director.

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MONROVIA — CALIFORNIA

A modern 18 bed sanatorium with a double suite of rooms for each patient; beautifully situated in the foothills of the Sierra Madre mountains.

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## St. Joseph Sanatorium and Hospital

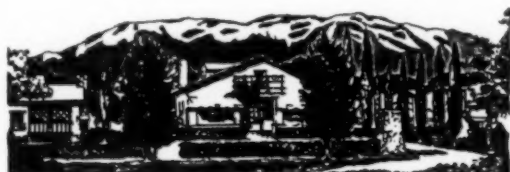
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A sanatorium for the treatment of tuberculosis and other diseases of the lungs. Located in the foothills of the Sierra Madre Mountains. Southern exposure. Accommodations are private, modern and comfortable. General care of patient is conducive to mental and physical well being.

Sister Mary Edward, Superintendent

**E. W. Hayes, M.D.**, Medical Director

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Excellent Medical and Affiliated Surgical Treatment for Tuberculous patients. Well Known For Home-Like Environment and Excellent Food.

### Sycamore Hall Sanatorium

Equipped with every modern convenience.

**MARCUS W. NEWCOMB, M.D.**, Medical Director



## ORGANIZATION NEWS

### President Wires Condolence

*Mrs. Lawrason Brown, Saranac Lake, N. Y.*

The American College of Chest Physicians is deeply grieved at the passing of our great pioneer and leader.

E. W. Hayes, M. D., President,  
American College of Chest Physicians

### Elected President County Medical Society

Dr. Wm. C. Voorsanger, San Francisco, California; a Fellow of the American College of Chest Physicians, and Chairman for the General Arrangements Committee for the 1938 meeting of the American College of Chest Physicians has been elected President of the San Francisco County Medical Association.

### New Fellows

The Board of Regents announces the acceptance of the following physicians as Fellows in the American College of Chest Physicians during the month of January.

Dr. F. J. Altschul, Long Branch, N. J.  
Dr. F. Baum, Newark, N. J.  
Dr. R. Charr, White Haven, Pa.  
Dr. R. J. Hanna, Jackson, Michigan.  
Dr. J. Rosenblatt, Duarte, Calif.  
Dr. J. Smith, Rio Piedras, P. R.  
Dr. A. S. Webb, Chicago, Illinois.  
Dr. W. A. Winn, Springville, Calif.

### Fellows Head State Tuberculosis Committees

Dr. W. S. Rude, Watauga Sanatorium, Ridgetop, Tennessee, a Fellow of the American College of Chest Physicians, has been appointed as the chairman of the State Tuberculosis Committee of the Tennessee State Medical Society. Dr. J. L. Hamilton, Chattanooga, Tennessee, a Fellow of the American College of Chest Physicians, is a member of the committee.

### Carman Offers Speaker Service

Dr. H. Frank Carman, Dallas, Texas, a Fellow of the American College of Chest Physicians, and President of the Texas Tuberculosis Association has addressed letters to the medical societies of Texas offering the services of physician lecturers for programs of medical societies. It is hoped that the medical societies will take advantage of this offer and that Fellows of the College in other states will inaugurate a similar service. This is in keeping with our program for a closer relationship between the chest specialist and the physician in the general practice of medicine.

### Minnesota Public Health Association Elects

Dr. S. A. Slater, Worthington, Minn., a Fellow of the American College of Chest Physicians, was elected President of the Minnesota Public Health Association. Dr. Slater is the superintendent and medical director of the Southwestern Minnesota Sanatorium. Dr. Russell A. Frost, Wabasha, Minn., a Fellow of the American College of Chest Physicians was elected First Vice President of the Minnesota Public Health Association. Dr. Frost is superintendent and medical director of Buena Vista Sanatorium.

### SOCIETY NEWS

Dr. John B. Hawes, 2nd., Boston Mass., a Fellow of the American College of Chest Physicians, read a paper entitled, "The Care of the Patient after the Sanatorium" before the Graduate Conferences held at Detroit jointly by the Wayne County Medical Society, the Detroit Department of Health, and the Detroit Tuberculosis Sanatorium.

Dr. Louis F. Knoepp, Beaumont, Texas, a Fellow of the American College of Chest Physicians, read a paper before the Hardin-Tyler Counties Medical Society entitled, "Surgical Lesions in Tuberculosis".

Dr. Francis J. Welch, Portland, Maine, a Fellow of the American College of Chest Physicians, read a paper before the Portland Medical Club on November 2nd, entitled, "An x-ray Legend of Tuberculosis".

Dr. John Alexander, Ann Arbor, Michigan, a Fellow of the American College of Chest Physicians read a paper before the meeting of the Western Surgical Association at Indianapolis entitled, "The Indications, Technic, and Results of Surgery for Bronchiectasis".

Dr. Chevalier L. Jackson, Philadelphia, Pa., a Fellow of the American College of Chest Physicians and his father Dr. Chevalier Jackson were among the speakers on the annual Pan American Cruise Congress.

Dr. Edgar Mayer, New York, N. Y., a Fellow of the American College of Chest Physicians, was conferred the Order of Merit of Carlos Finlay as a recognition of his medical and public health services to Cuba. Dr. Mayer is a member of the Faculty of Cornell University.

Dr. Louis H. Clerf, Philadelphia, Pa., a Fellow of the American College of Chest Physicians, has been made professor of laryngology and bronchoscopy at Jefferson Medical College. Dr. Clerf is professor of bronchoscopy and esophagoscopy at Jefferson Medical College.

Dr. John F. Busch, Greenville, S. C., a Fellow of the American College of Chest Physicians, has resigned as superintendent of the Greenville County Sanatorium to join the staff of the Georgia State Board of Health, it is reported.

Dr. John A. Sklavem, Cincinnati, Ohio, a Fellow of the American College of Chest Physicians, addressed the 139th semi-annual meeting of the Union District Medical Society, Brookville, Indiana.

Dr. Jay Arthur Myers, Minneapolis, Minn., a Fellow of the American College of Chest Physicians, and President of the National Tuberculosis Association was the guest speaker at the annual meeting of the New Jersey Tuberculosis League in New Jersey.

Dr. Elmer E. Glenn, Springfield, Missouri, a Fellow of the American College of Chest Physicians, gave a paper before the District Medical Society, Harrison, Arkansas, entitled, "Pneumonia and its Complications".